DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER BUREAU
DRINKING WATER & ENVIRONMENTAL HEALTH SECTION
WELL CONSTRUCTION UNIT

High Capacity Water Wells – Frequently Asked Questions

New laws that address the management of groundwater resources and effect the installation of high capacity water wells became effective on February 28, 2006. The enactment of laws amending Part 327 - Great Lakes Preservation, of the Natural Resources and Environmental Protection Act, 1994 PA 451 (NREPA), Part 328 – Aquifer Protection, NREPA, and 1976 PA 399, Safe Drinking Water Act (SWDA), has prompted many questions from well drilling contractors and local health department officials about procedures that need to be followed to comply with the new requirements.

This handout is intended as guidance on high capacity well permitting and water use reporting and provides information on other laws that effect the installation and operation of a high capacity well (HCW).

1. What is a high capacity well and/or large quantity withdrawal?

Part 317 – Aquifer Protection and Dispute Resolution, NREPA defines a "high capacity well" as follows:

> *"One or more water wells associated with an industrial or processing facility, an irrigation facility, a farm, or a public water supply system, that in aggregate from all sources and by all methods, have the capability of withdrawing 100,000 or more gallons of groundwater in one day."*

Determination of a well's withdrawal capability is based on the *rated pump capacity*, rather than the yield measured during well development or test pumping. Refer to the pump manufacturers' pump curve for the specific model of the permanent well pump. Pumping at a rate of 70 gallons per minute (gpm) or more will exceed 100,000 gallons per day (gpd) and classify the well as a HCW.

Part 327, NREPA (as amended by 2006 PA 33) defines a "large quantity withdrawal" as follows:

> *"1 or more cumulative total withdrawals of over 100,000 gallons of water per day average in any consecutive 30-day period that supply a common distribution system."*

A large quantity withdrawal may obtain its water supply from surface water or groundwater. Aside from a few exceptions such as lake augmentation wells, a large quantity withdrawal obtained from a groundwater source is considered a HCW under Part 317, NREPA.

2. What is the basis for using 100,000 gpd (70 gpm) as a threshold for high-capacity or large quantity withdrawals?

The 100,000 gpd figure is rooted in several statutes and regulations. Part 327, NREPA, and the Great Lakes Charter and Annex, under authority of the federal Water Resources Development Act of 1986, uses a withdrawal of 100,000 gpd average in any consecutive 30-day period as a regulatory threshold. Other Midwest states affected by the Great Lakes Charter and Annex use 100,000 gpd in their water regulations as a means of distinguishing between high and low capacity wells.

3. Are permits required for high-capacity wells?

Yes. Throughout Michigan, county or district health departments typically require that a permit be obtained (for a fee) before well construction is started. If the proposed HCW will furnish drinking water to the public or employees, a state permit under the SDWA may be needed, depending on the number of people served. Permits for wells serving a Type I community public water supply are obtained from the Department of Environmental Quality (DEQ) District Offices, and permits for wells serving smaller public water supplies (Type II and Type III) are obtained from the local health department.

Property owners and well contractors should check with their county or district health department to find out if a permit is needed for the type of well they intend to install. Sixty eight counties require a permit for high-capacity wells intended solely for nonpotable use. Counties that do not require a permit (as of May 12, 2007) are listed below:

Alcona	Berrien	Branch	Cass	Hillsdale
Ingham	Ionia	Iosco	Kalamazoo	Midland
Muskegon	Ogemaw	Oscoda	St. Joseph	Van Buren

Compliance with Part 127 of the Public Health Code, 1978 PA 368 (Part 127), and its associated administrative rules is the first step in ensuring a HCW will provide a safe and reliable water source for the future. Part 127 and local regulations related to HCW installation are available through the local health department and are typically incorporated into the permit application process.

Effective February 28, 2006, state water withdrawal/use permits under Part 327, NREPA, are required in the following circumstances:

- New or increased groundwater withdrawals of greater than 2 million gpd (or 1,400 gpm), from waters of the state other than the Great Lakes and their connecting waterways.
- Withdrawals of 5 million gpd (or 3,500 gpm) or greater from the Great Lakes and their connecting waterways.

Exceptions to the Part 327, NREPA, permit requirement include any of the following:

- Community water supplies owned by a political subdivision that hold a permit under the SDWA.
- Seasonal withdrawals averaging not more than 2 million gpd over a consecutive 90-day period.
- Bottled water operations approved under a water source review per the SDWA.

Water Withdrawal/Use Permit Information Requirements:

A person shall apply for a permit from the DEQ under Part 327, NREPA, by submitting the following:

- The place and source of the proposed or existing withdrawal.
- Location of any discharge or return flow.
- The location and nature of the proposed or existing water user.
- Actual or estimated average annual and monthly volumes and rate of withdrawal.
- Actual or estimated average annual and monthly volumes and rates of consumptive use from the withdrawal.
- A $2,000 fee (in effect until Feb. 28, 2011).

Water Withdrawal/Use Permit Issuance Criteria:

A permit is granted for withdrawals of over 2 million gpd from waters of the state other than the Great Lakes and their connecting waterways if the department determines that the withdrawal is not likely to cause an adverse resource impact. The DEQ shall issue a permit for withdrawals greater than 5 million gpd from the Great Lakes and their connecting waterways if the following conditions are met:

- All water, less consumptive use, is returned to the source watershed.
- The proposal will be implemented so that no adverse resource impact occurs.
- The withdrawal is in compliance with all applicable local, state, and federal laws as well as legally binding regional interstate and international agreements.
- The use is reasonable under common law principles of water law in Michigan.
- The applicant considered voluntary generally accepted water management practices of environmentally sound and economically feasible water conservation measures.

A permit related to cooling water intake structures for thermal discharges issued under Part 31 – Water Resources Protection, NREPA is considered sufficient to demonstrate that no adverse resource impact will occur and satisfies the conditions of a Part 327, NREPA, permit. Upon receipt of a permit application and evidence that the applicant holds a valid Part 31 permit, the DEQ shall grant a permit under Part 327, NREPA for these withdrawals.

4. What is an "adverse resource impact?"

An adverse resource impact is defined as a decrease in the flow of a stream by part of the index flow or level of a body of surface water such that the feature's ability to support characteristic fish populations is functionally impaired. The amendments to Part 327, NREPA, state that a person shall not make a new or increase large quantity withdrawal from the waters of the state that causes an adverse resource impact to a designated trout stream during the first two years of enactment. After the expiration of the two year period, the regulation of adverse resource impacts under Part 327, NREPA, are no longer limited to designed trout streams and will apply to all streams.

5. How do I apply for a large quantity withdrawal permit required under Part 327, NREPA?

The DEQ, Water Bureau, is assigned the duty of implementing the Part 327, NREPA permit program. Application inquiries as well as other program information can be obtained by contacting Mr. Brant Fisher at 517-241-1415.

6. If I am developing a new or increased large quantity withdrawal less than the two and five million gpd specified for a Part 327, NREPA permit, do I need to submit information to the DEQ to determine if I will cause an adverse resource impact?

No. An adverse resource impact determination is not necessary. A person proposing a withdrawal that does not require a permit may petition the DEQ to determine whether the withdrawal would cause an adverse resource impact. The petition will include the information as requested under a Part 327, NREPA permit, a $5,000 fee, along with an evaluation of environmental, hydrological, and hydrogeological conditions that exist and predicted effects of the intended withdrawal that provides a reasonable basis for the determination to be made.

7. How can the potential for adverse resource impacts be minimized?

Until a water withdrawal assessment tool becomes effective upon legislative enactment, there is a rebuttable presumption that a new large quantity well, or an increase to an existing large quantity withdrawal, will not cause an adverse resource impact in violation of Part 327, NREPA, if the well is located more than 1,320 feet from the banks of a designated trout stream, or if withdrawal depth of the well is at least 150 feet.

The water withdrawal assessment tool is currently under development. Once approved for use, the water withdrawal assessment tool can be utilized by a person proposing a new or increased large quantity withdrawal to assist in determining whether the proposed withdrawal may cause an adverse impact to the waters of the state.

8. What are the registration and reporting requirements for a HCW?

The State of Michigan requires registration and water use reporting under Part 327, NREPA and under the SDWA. Part 327, NREPA, registration applies to the owners of real property who have the capacity to withdrawal 100,000 gpd of water average in any consecutive 30-day period that supplies a common distribution system. Owners who meet these conditions but are exempt from registration include:

- A person who has previously registered.
- A community supply owned by a political subdivision that holds a permit under the SDWA.
- A person holding a permit under Part 327, NREPA.
- An owner of a noncommercial well on residential property.

In most cases, registration must occur before the withdrawal begins. Registration information required for submittal includes:

- The place and source of the proposed or existing withdrawal.
- Location of any discharge or return flow.
- The location and nature of the proposed or existing water user.
- Actual or estimated average annual and monthly volumes and rate of withdrawal.
- Actual or estimated average annual and monthly volumes and rates of consumptive use from the withdrawal.

Registration by the owner of a farm in which the withdrawal is intended for an agricultural purpose, including irrigation, shall be submitted to the Michigan Department of Agriculture (MDA). All other registrants submit the information to the DEQ.

Non-Agricultural Water Use Reporting:

A person who is required to register or holds a permit under Part 327, NREPA, must report annually with the DEQ. DEQ reporting includes:

- The amount and rate of water withdrawn on an annual and monthly basis.
- The source of sources of water supply.
- The use or uses of the water withdrawn.
- The amount of consumptive use of water withdrawn.
- The location of the well or wells in latitude and longitude with the accuracy of the reported location data to within 25 feet.
- Static water level of the aquifer or aquifers.

At the discretion of the registrant or permit holder, the baseline capacity of the withdrawal, description of the system capacity, and the amount of water returned to the source watershed may be submitted as part of the 2007 report.

An annual $200 water use reporting fee is currently associated with the remittance of the documentation to the DEQ. A person who withdraws less than 1,500,000 gallons of water in any year shall indicate this fact on the reporting form and is not required to provide the amount and rate of water withdrawn, the amount of consumptive use of water withdrawn, or the water use reporting fee.

Agricultural Water Use Reporting:

The owner of a farm who makes a withdrawal for an agricultural purpose that is required to register or holds a permit under Part 327, NREPA, must report to the DEQ (see previous section) or to the MDA. If the farm chooses to report to the MDA, the owner is responsible for submitting a water use conservation plan that includes:

- The amount and rate of water withdrawn on an annual and monthly basis.
- The type of crop irrigated.
- The acreage of each irrigated crop.
- The source or sources of the water supply.
- The location of the well or wells in latitude and longitude with the accuracy of the reported location data to within 25 feet.
- Uses of any non-irrigation water withdrawn.
- The static water level in pumping well(s).
- Applicable water conservation practices and an implementation plan for those practices.

The farm may also choose to report the baseline capacity of the withdrawal based upon system capacity and a description of the system capacity in 2007.

9. How to obtain a water use reporting form and other information:

Water use reporting forms are mailed out each year by DEQ and MDA to well owners who have previously reported their large quantity withdrawals. Persons who report shall submit the documentation by April 1 of each year.

DEQ water use reporting forms are available online at www.michigan.gov/deq, under "Water," "Water Management," and "Water Use Program." MDA water use reporting forms are also available for download at www.michigan.gov/mda, under "Farming," "Environment," and "Water Use Reporting."

HCW owners should have an easy and accurate way to collect and document the information needed under Part 327, NREPA. A lack of planning could make tasks such as the collection of a static water level from a pumping well a long, burdensome, and uncertain activity. Airlines or ports for lowering electronic water level tapes should be included when pumping equipment is installed on a HCW.

Details related to reporting requirements under the SDWA are extensive and available through the community water supply program within the DEQ. The use of outside contractors within this area of expertise may be necessary to ensure appropriate reporting is completed.

Additional inquiries related to water use reporting can be directed to Mr. Andrew LeBaron, DEQ, Water Bureau, at 517-241-1435, or Mr. Robert Pigg, MDA, Environmental Stewardship Division, at 517-373-6893.

10. Is a hydrogeological study or aquifer test needed when a HCW well is installed?

A hydrogeological study or yield test is required if the high-capacity well is serving a Type I (community) public water supply, Type II (noncommunity) public water supply, or Type III public water supply. The aquifer performance test must be performed in accordance with ***DEQ, Policy and Procedures, WD-03-003, Aquifer Test Requirements for Public Water Supply Wells, December 1, 1997 (Rev. #3 – 3/2004)***. This policy can be obtained from the DEQ webpage at: www.michigan.gov/deq under the links: "Water", "Drinking Water", "Water Well Construction", "Directory of Operational Memos/Policies/Guidance."

Although recommended, an aquifer or yield test is not required under Part 317, NREPA. A yield test is advised for new high capacity wells because it can be used to delineate the boundaries of the cone of depression and gives the well owner information needed to properly manage the resource and prevent an impact on neighboring water wells. A document called ***Yield Tests for High Capacity Wells*** is available from the above DEQ website.

Regarding Part 327, NREPA, an evaluation of environmental, hydrological, and hydrogeological conditions that exist and predicted effects of the intended withdrawal is required when a person chooses to submit a petition for a determination that a new or increased withdrawal is not likely to cause an adverse resource impact.

Under R 325.1613 of the Groundwater Quality Control Rules, adopted under Part 127, a hydrogeological study may be required by a health officer to support a request for a deviation from minimum isolation distances from contamination sources.

11. How can a HCW well impact neighboring wells and its surrounding environment?

The groundwater level around a well drops in response to pumping and forms a cone of depression. The radial extent and shape of the cone is influenced by pumping rate, duration of pumping, aquifer characteristics and recharge patterns.

If the cone of depression reaches other wells, those wells may be impacted. Many wells located within the cone of depression of other wells continue to operate normally because the pump intake remains submerged below the water level within the well. The water level may have been lowered by a HCW or by the combined effects of small quantity wells in the area, but if the pump drop pipe is long enough to keep the pump intake submerged, the well operation is not interrupted.

When the water level within a well drops below the pump intake, water delivery from the well is temporarily diminished or may cease altogether. Pumps may need to be lowered in wells close to a HCW. If an adequate water column (or sufficient pump submergence) is not available in the effected well, the well will need to be deepened or replaced.

Many factors influence whether a pumping well has any measurable effect on its surrounding environment. In certain hydrogeologic settings, a HCW can lower water levels of nearby streams, rivers or wetlands. For example, a small stream that depends on groundwater to maintain temperatures for certain aquatic habitats may be susceptible to damage if a large groundwater withdrawal diverts groundwater away from the stream. Major rainfall or snowmelt events directly influence groundwater levels as they recharge aquifers. A HCW that lowers groundwater levels during a prolonged drought may have no measurable adverse effect on groundwater levels after a major rainfall. Large municipal well fields have caused regional, sustained depression of ground water levels. Modern society generally accepts this type of environmental alteration as a tradeoff for a city's need to furnish drinking water to its citizens and industries.

12. How far away can the impact of a HCW be measured?

The U.S. Geological Survey, Department of Interior, recorded groundwater level recovery measurements over eight miles from a Monroe County, Michigan quarry after the 8.5 million gpd dewatering discharge ceased in December 2002. Aquifer characteristics, well depth, rate and duration of well pumping, recharge rates, as well as many other factors should be evaluated in order to determine the potential influence of well pumping on groundwater levels and surface water features at various distances.

13. What action can be taken if a well is failing to produce its normal water supply and the well owner suspects the problem is caused by a HCW?

The owner of a small quantity well (<70 gpm) may file a complaint under Part 317, NREPA with the DEQ (or MDA if the HCW is an agricultural well) to attain relief. Once a written well assessment is performed by a Michigan Registered Water Well Drilling Contractor showing the well and pumping equipment are functioning properly and are not the cause of the well failure, the DEQ (or MDA) will conduct an investigation. If the investigation discloses that the failure of the small quantity well was caused by the lowering of the groundwater level in the area by a HCW, the DEQ (or MDA) will propose a remedy to equitably resolve the complaint. If the HCW refuses to resolve the complaint, the director of the DEQ will issue an order declaring a groundwater dispute. The order may restrict the quantity of groundwater to be extracted from the HCW or demand reimbursement of expenses by the HCW owner to restore/provide an alternative water supply to the small quantity well owner. An impacted well owner also has the ability to pursue a civil case in court against the HCW owner.

14. What can a HCW owner do to avoid a potential groundwater dispute under Part 317, NREPA?

As stated previously, an aquifer test (yield test) or hydrogeologic study are the preferred methods to determine the effects of HCW pumping. Testing the well's operation to determine potential impacts, then adjusting withdrawal rates and patterns to minimize impacts is an effective means of preventing groundwater dispute complaints from being filed with the DEQ or MDA. However, HCW owners often do not want to perform yield tests due to cost. At a minimum, a HCW owner should review available groundwater information and conduct a simple observation well water level monitoring plan.

The DEQ recently completed a statewide groundwater inventory and mapping project. A vast amount of groundwater data is accessible to the public through the website:

http://gwmap.rsgis.msu.edu

The website provides regional data on topics such as location and water yielding capabilities of aquifers, aquifer recharge rates, and static water levels of groundwater in the state. A database of publications related to groundwater resources in Michigan is also included.

Another means of preventing complaints from escalating is for the HCW owner to take a proactive approach with neighboring well owners. Some HCW owners have agreements with area well owners to conduct, at the HCW owner's expense, a preliminary well assessment before pumping of the HCW begins. The agreement may include provisions for the neighboring well owners to notify the HCW owner if a well problem arises. A provision for prompt restoration of the water supply through well replacement or municipal water hookup should be included in the agreement.

The installation and monitoring of observation wells within the same aquifer as the HCW can provide valuable information regarding the effects of a HCW on neighboring wells. Placement of the observation wells should be at varying distances from the HCW, within applicable aquifers of concern, and located in areas between the HCW and area small quantity wells. Measurements should be taken during pumping of the HCW as well as before and after any long periods of non-use. At a minimum, measurements during pumping should be recorded from time periods just prior to shut-off or when aquifer conditions are near equilibrium. If drawdown (the difference between non-pumping and pumping level), is negligible in the observation wells, the pumping of the HCW is most likely not affecting nearby wells. Upfront investment of time and money can provide the evidence necessary to determine the extent of groundwater lowering by the HCW. Good communication and taking a proactive approach are positive steps toward avoiding protracted groundwater disputes.

15. <u>If I have additional questions regarding the installation and use of a HCW, who should I contact?</u>

Numerous groundwater professionals and hydrogeologic consultants are available to help HCW owners with their water supply needs. A reputable firm can be located by contacting other members within the HCW owner's industry, checking references, and reviewing the consultant's previous work products.

The DEQ is also available to discuss the programs that affect HCWs. Questions regarding Part 317, NREPA, should be directed to DEQ, Water Bureau, Lansing Operations Division, Drinking Water and Environmental Health Section, at 517-241-1377. Other DEQ inquiries can be made through the Environmental Assistance Center, at 800-662-9278.

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